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PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	E. Wendell Diller
Application No.:	09/923272
Filed:	August 3, 2001
For:	Elongate Vented Gun Barrel (quiet gun)
Examiner:	Michelle Clement
Group Art Unit:	3641

Mail Stop RCE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Docket No.: D55.2B-10027-US01

DECLARATION PURSUANT TO 37 C.F.R. §1.132

1. My name is Scott Crist and I graduated from the University of Minnesota with an Associate of Arts degree.

2. I have been an electronics design engineer in weapons development for over 30 years with Alliant Techsystems Inc. (formerly Honeywell Defense Systems). I also understand basic engineering principals related to weapon design. My current position is Engineering Consultant which I have held for 3 years. I am also a co-inventor of five patents. Please see my attached resume for a more complete identification of my employment history related to weapon design.

3. Based upon my experience I believe that I am a person skilled in the art of weapon design.

4. I have read and understand U.S. Patent App. No. 09/923,272 and the claims as attached hereto as Exhibit 1. I am providing this Declaration in support of the patentability of the

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Wendell Diller application disclosed in App. No. 09/923,272 and as identified in the claims attached hereto as Exhibit 1.

5. I have read and understand Claim 1 of U.S. Patent App. No. 09/923,272 which is reproduced below:

Claim 1. A firearm comprising:

- a) one elongate barrel having a breach end a muzzle end and a discharge opening, said elongate barrel having a length dimension, said length dimension being of at least 3 1/2 feet; and
- b) a plurality of vents disposed through said elongate barrel, said vents initiating beyond twelve inches from said breach end, said vents terminating proximate to said muzzle end, said vents having a size of approximately 3/8 inch in diameter or greater, said vents being constructed and arranged to minimize sound report by gradual release of gasses directly to the surrounding atmosphere through said vents along said length dimension of said barrel toward said muzzle end of said firearm following discharge of said firearm, said vents minimizing gas pressure proximate to said muzzle end.

6. In my opinion, the disclosure of U.S. Patent App. No. 09/923,272, and the claims, in conjunction with the knowledge that one skilled in the art has of fluid dynamics (or weapons design), enables a person skilled in the art to make, use, and/or reproduce the invention as disclosed in claim 1, for the provision of vents along an elongate firearm barrel to minimize sound report and gas pressure at the muzzle end, due to the gradual discharge of gasses along the length of the gun barrel through the vents.

7. In my opinion, based upon the specification and claim 1 of U.S. Patent App. No. 09/923,272, and my knowledge of fluid dynamics and weapons design, I could duplicate the venting requirements to minimize sound report for the elongated vented gun barrel without undue experimentation.

8. I have read and understood claim 19 of U.S. Patent App. No. 09/923,272, which is reproduced below:

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Claim 19. A firearm comprising:

a) one elongate barrel having a breach end and a muzzle end, said elongate barrel having a length dimension, said length dimension being of at least 3 ½ feet; and  
b) a plurality of vents disposed through said elongate barrel, said vents initiating beyond twelve inches from said breach end, said vents terminating proximate to said muzzle end, said vents positioned along the barrel to minimize sound report by gradual release of gasses directly into the atmosphere through said vents along said length dimension of said barrel toward said muzzle end of said firearm following discharge of said firearm, said vents reducing gas pressure proximate to said muzzle end.

9. In my opinion, U.S. Patent App. No. 09/923,272, and the knowledge possessed one skilled in the art of fluid dynamics or weapons design, would enable a person skilled in the art to make, use, and/or reproduce the invention as disclosed in claim 19 identified above without undue experimentation.

10. I have read and understand U.S. Patent 5,844,162 to Renner, which discloses a barrel having vents or ports positioned adjacent to the muzzle end of a firearm barrel. The purpose of the vents or ports of the Renner 5,844,162 patent are in my opinion to direct combustion gasses perpendicular to the axis of the bore to reduce recoil and "barrel jump" which improves aiming and accuracy. This was common practice of weapon manufacturers for use in gun designs at, or before, the Renner patent of 1998. The Renner 5,844,162 patent of 1998 addresses the SPECIFIC needs peculiar to a muzzle loading rifle to reduce recoil and "barrel jump" and to prevent damage to the wadding or patches employed in a muzzle loading rifle thereby minimizing risk of damage to the barrel.

11. In my opinion, the vents of the Renner patent 5,844,162 are not designed to

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minimize sound report due to the gradual release of gasses directly to the surrounding atmosphere through the vents. Renner does not provide any assistance in the venting of an elongated gun barrel along the elongated gun barrel to minimize sound report and minimize the pressure of gasses proximate to the muzzle end, by the gradual release of gasses into the atmosphere through the vents placed along the length of the barrel. The minimization of sound report through venting along the length of the barrel is not apparent to a person skilled in the art reviewing the Renner patent 5,844,162.

12. I have also reviewed and discharged a prototype of a firearm of Wendell Diller which I believe is representative of claims 1 and 19 as identified herein. The sound report upon discharge of the Diller prototype in my opinion is, in fact, minimized as compared to other firearm barrels which I have observed, and/or discharged. In the past, single firearm "barrels" as known usually did not have a length dimension exceeding three feet. The firearm, including the stock, may have exceeded three feet in length, but the specific single barrel usually did not. It is my understanding that the problem of reducing or minimizing sound report or percussion within a conventional single barrel firearm was unavailable without the use of a federally regulated silencer. Venting of a single barrel of conventional length did not provide sufficient distance and/or time to permit the gradual release of gas pressure to minimize sound report, therefore, a federally regulated/prohibited silencer was required. The use of any number, size, or location of vents along a single barrel of conventional length did not minimize sound report. Only when an elongated single barrel was utilized, did sufficient distance and time become available to utilize vents, to minimize sound report at the muzzle end, through the gradual release of gasses along the length dimension of the elongated barrel through vents, and thus eliminating the need for a federally regulated silencer. At the time of Mr. Diller's invention, it did not occur to me to

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elongate a single barrel having a conventional length to increase the distance and time for gradual release of gasses along the length of a single barrel through vents, to minimize sound report and eliminate the necessity of silencer. I wish I had conceived of the sound minimizing vents along the length of the elongate barrel as invented by Mr. Diller. The firearm as identified within claims 1 and 19 herein would not have been obvious to a person of ordinary skill in the art, because the inventions identified in claims 1 and 19 were not obvious to me, without the prior exposure to the Diller application, claims, and Diller prototype herein.

13. I have read and understand U.S. Patent No. 5,315,914 to Schumacher which is directed to an over-under or side-by-side style firearm where each barrel has a discharge opening at the muzzle end and interior vents between the two adjacent barrels. The Schumacher Patent No. 5,315,914 does not teach the release of gasses into the atmosphere, except through the discharge openings at the muzzle ends of the two adjacent barrels, which act as a gun silencer chamber. The Schumacher Patent No. 5,315,914 does not teach the gradual release of gasses directly into the atmosphere as required by the BATF to avoid being classified as a gun silencer. Gun silencers employ a series of vents down the length of the bore of the silencer, in the same manner as the Schumacher Patent 5,315,914, which allows the gasses to escape into an adjacent chamber, which in turn allows the escape of the gasses into the atmosphere at the muzzle opening, at a lower velocity and sound pressure level. The series of vents in the Schumacher Patent No. 5,315,914 are vented into the empty adjacent chamber barrel which is the same chamber technology of a common gun silencer. The Schumacher Patent No. 5,315,914 simply employs the adjacent empty barrel as a crude gun silencer chamber, and the venting from the bore of the active barrel into what functions as the silencer chamber of the adjacent barrel, is simply a longer silencer bore than is used in gun silencers that are designed specifically for

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optimum silencer performance.

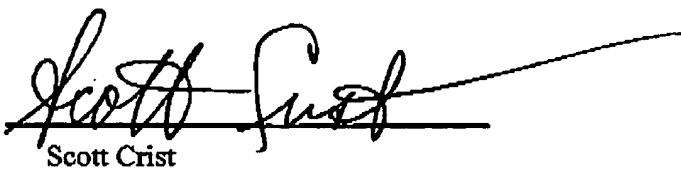
14. In my opinion, the interior vents of the Schumacher patent 5,315,914 are not made to minimize sound report by a gradual release of gasses directly into the surrounding atmosphere through vents along the length of a gun barrel. Schumacher patent 5,315,914 does not provide the necessary teaching to a person of ordinary skill in the art to minimize sound report by the gradual release of gasses directly into the surrounding atmosphere through vents positioned along the length of a gun barrel without the teaching of the present application.

15. It is my opinion that a person of ordinary skill in the art reviewing the Schumacher patent 5,315,914 would understand that the Schumacher patent 5,315,914 was of a common silencer design and would not have been able to use the Schumacher disclosure to make the elongate vented gun barrel as described in claims 1 and 19 as indicated above.

All statements made herein of my knowledge are true; all statements made on information and belief are believed to be true; and all the foregoing statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment or both under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of this application and any registration resulting therefrom.

Date: Nov 6, 2006

By:

  
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Scott Crist

Title: Engineering Consultant

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**Scott D. Crist – Electronics Design Engineer**

**9/21/06**

**Clearance Level:** Secret

**Education:** University of Minnesota, AA

**Experience –**

**2003 – 2006:** President, Crist Engineering, Inc. Consultant to Alliant Techsystems, Inc. (ATK). Advanced “influence” sensor designs for munitions applications.

**1994 – 2003:** Principal Staff Engineer, ATK, Electronics/Fuzing Group. Primarily involved with the concept/design of 120mm Tank Ammo (sensor fuzed/precursor) KE projectiles. Technical consultant to other (artillery and mines) fuzing programs. IR&D lead for new submunition anti-armor/personnel proximity fuzing concepts. In general, work included extensive low power analog and digital circuit design including firing algorithm concepts/design.

**1992 – 1994:** Principal Staff Engineer, ATK, Research/Technology Fuzing Group. Involved in electrostatic, magnetic, IR, and RF sensor fuzed projectile applications. Work was performed under a special “Value Kernel” charter.

**1990 – 1992:** Technical Director, ATK, Surface Ship (Hard Kill) Torpedo Defense Program. (Program was transferred to an ATK west coast facility - which was eventually sold. I transferred to the fuzing group instead of relocating.)

**1985 – 1990:** Deputy Technical Director, Mk50 Torpedo FSED Program, Honeywell Defense Group (which later became Alliant Techsystems or “ATK”). Overall technical responsibility for the design and development of the lightweight anti-submarine torpedo forebody components including; phased array sonar, target sensor, command and control, and exercise (warhead replacement) sections.

**1980 – 1985:** Senior Staff Engineer, Honeywell Defense Group. Sonar liaison / technical interface for Advanced Lightweight Torpedo development. Provided system interface technical lead between sonar subsystem development and torpedo command & control section. Work included system level requirements and specification generation.

**1977 – 1980:** Senior Principal Development Engineer, Honeywell Defense Group. Various magnetic/acoustic sensor development programs as related to “smart mines” – specifically their low-noise amplifier/processing detailed designs. Recipient of the Honeywell “Technical Achievement Award” for this work.

**1974 – 1977:** Chief Engineer, Audio Research Corporation. “High-end” audio products design and development. Responsible for introduction of their first solid-state

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amplifier product line.

**1966 – 1974:** Senior Development Engineer, Honeywell Defense Group. Magnetic and seismic target/intrusion sensor designs (MAGID T4 and MAID). These were “point” and “line” sensors, extensively used in Viet Nam and for SAC airbase perimeter protection respectively.

**1960 – 1966:** Principal Engineering Assistant, University of Minnesota’s St. Anthony Falls Hydraulics Laboratory. Hydrodynamic instrumentation design for support of various professors research projects. Work included (4) papers/publications, listed below.

**Selected Publications (University of Minnesota):**

“The Effect of Dilute Solutions of Drag Reducing Polymers on Radiated Flow Noise”, July 1967.

“A Study of the Influence of Microbubbles on Hydrodynamic Flow Noise”, April 1966.

“A New Facility for Evaluation of Materials Subject to Erosion and Cavitation Damage”, March 1965.

“A Digital Point Gage”, July 1964.

**Patents:**

- (1) # 6,196,130 March 6, 2001 Electrostatic Arming Apparatus for an Explosive Projectile
- (2) # 6,094,054 July 25, 2000 Radome Nose Cone Probe Apparatus for Use with Electrostatic Sensor
- (3) # 5,497,704 March 12, 1996 Multifunctional Magnetic Fuze
- (4) # 4,414,652 November 8, 1983 Ultrasonic Line Sensor
- (5) # 4,081,627 March 28, 1978 Electromagnetic Bipolar Loud-Speaker

**Societies:** Prior member of the Audio Engineering.

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**EXHIBIT 1**

1. A firearm comprising:

- a) one elongate barrel having a breach end, a muzzle end and a discharge opening, said elongate barrel having a length dimension, said length dimension being of at least 3 1/2 feet; and
- b) a plurality of vents disposed through said elongate barrel, said vents initiating beyond twelve inches from said breach end, said vents terminating proximate to said muzzle end, said vents having a size of approximately 3/8 inch in diameter or greater, said vents being constructed and arranged to minimize sound report by gradual release of gasses directly to the surrounding atmosphere through said vents along said length dimension of said barrel toward said muzzle end of said firearm following discharge of said firearm, said vents minimizing gas pressure proximate to said muzzle end.

2. The firearm according to claim 1, wherein said elongate barrel has a length of less than 12 feet.

3. The firearm according to claim 2, wherein said elongate barrel is formed of barrel sections.

4. (Withdrawn) The firearm according to claim 3, wherein said barrel sections are releasably coupled to each other.

5. The firearm according to claim 3, wherein said barrel sections are fixedly secured to each other.

6. The firearm according to claim 3, wherein each of said barrel sections have the same length dimension.

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7. (Withdrawn) The firearm according to claim 3, wherein at least two of said barrel sections have different length dimensions.
8. The firearm according to claim 3, wherein said elongate barrel has a length of approximately seven feet.
9. The firearm according to claim 2, wherein said plurality of vents are of the same size.
10. (Withdrawn) The firearm according to claim 2, said plurality of vents comprising vents of at least two different sizes.
11. (Cancelled)
12. The firearm according to claim 2, wherein said vents are grouped into at least one sector.
13. (Withdrawn) The firearm according to claim 12, wherein said vents are regularly spaced within each of said sectors.
14. The firearm according to claim 12, wherein said vents are irregularly spaced within each of said at least one sector.
15. The firearm according to claim 12, wherein said vents are the same size within each of said at least one sector.
16. (Withdrawn) The firearm according to claim 12, said vents comprising vents of at least two different sizes within each of said sectors.
17. The firearm according to claim 12, wherein each of said at least one sector have an identical length dimension.

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18. (Withdrawn) The firearm according to claim 12, wherein at least two of said sectors have a different length dimension.

19. A firearm comprising:

a) one elongate barrel having a breach end and a muzzle end, said elongate barrel having a length dimension, said length dimension being of at least 3 1/2 feet; and  
b) a plurality of vents disposed through said elongate barrel, said vents initiating beyond twelve inches from said breach end, said vents terminating proximate to said muzzle end, said vents positioned along the barrel to minimize sound report by gradual release of gasses directly into the atmosphere through said vents along said length dimension of said barrel toward said muzzle end of said firearm following discharge of said firearm, said vents reducing gas pressure proximate to said muzzle end.

20. (Cancelled)

21. The firearm according to claim 19, wherein the barrel is constructed of two or more sections.

22. The firearm according to claim 19, wherein the vents have a diameter of approximately 3/8 inch or less.

23. The firearm according to claim 21, wherein at least one section is constructed of material selected from the group consisting of light-weight metal, plastic, and fiberglass.